Wednesday, January 28, 2004

**Federal Communications Commission Laboratory**
**7435 Oakland Mills Road**
**Columbia, MD 21046**

## Re: Description of Block Diagram – In Wall Sensor

Gentlemen:

This correspondence concerns certification data for a personal hygiene bathroom device, Technical Concepts Autoflush system. The FCC ID for this device is RNV0009919150, Confirmation number EA817616. The FCC registration number of our laboratory is 496406, FRN 0005-8509-95. The technical contact for Technical Concepts on this device is Mr. George Jost, Chief Engineer, and for our laboratory is the undersigned. Test data was taken from this device in November and December, 2003. The location of the 10 meter OATS used is 7017 Miller Road, Wonder Lake, Illinois. The location of the 3 and 5 meter indoor site used is 21234 West Commercial Drive, Mundelein, Illinois.

The equipment under test consists of two portions, the Autoflush transmitter system, a battery operated (4 AA cell) wireless transmitter that operates at 318 Mhz fixed frequency controlled by a surface acoustic wave resonator and the receiver system, a companion device that is comprised of an integrated superhetrodyne receiver system powered by 4 C cells. The device is used in the bathrooms of hotels, office buildings, restaurants and other places used by the general public. The transmitter generates a signal based on movement detected by an infrared sensor and converts that indication into an amplitude modulated and 24 bit encoded signal that may be transmitted to the receiver up to about 4 feet away. The receiver may detect such a transmission and if it is a match to an encrypted code, will activate a flushing mechanism on a commode. The flushing system is comprised of a motorized apparatus that is installed inside the commode. The transmitter is normally located behind the patron on a wall of the enclosure.

### Description of Block Diagram

The block diagram is shown in the embedded PDF file "Technical Concepts Wireless Transmitter Block Diagram". You may bring this file up by double clicking on this icon. 


The major subsystems comprising the transmitter are 1) 6 volt power pack, BT1, 2) 3.6 volt regulator, U1, 3) Precision voltage detector, U5, 4) Infrared receiver preamplifier, U2A-B, 5) Infrared Receiver, DT1, 6) Infrared Transmitter, D3, 7) Indicator LED lamps, D6 and D7, 8) Master Controller, U3, 9) Message Encoder, U4 and 10) RF power oscillator, Q7. The overall purpose of the transmitter system is to sense the present of a person about 4 feet away from the detector, and, if present, wait until the person leaves the area and then transmits an encoded and frequency selective RF signal to a receiver which performs a motorized flushing function.

The controller sequences the activities of this function and it is an OTP proprietary device. The voltage from the power pack will vary as it ages and the purpose of the regulator is to keep the voltage fixed at 3.6 volts until the battery pack is exhausted. When in the normal condition, a green indicator light on the front panel signifies the sensor is active and working normally. The voltage detector function is to sense the point of exhaustion of the battery and alert the controller to that situation. When the battery is low (<5.0V), the controller will signify that by turning on a yellow indicator until the situation is remedied by replacing the batteries. In the low battery condition the RF circuit will not deviate from its normal frequency but the RF power will drop until the batteries are dead. The details of the operation of the voltage detector, encoder, and controller are supplied in the following PDF files that you may access by clicking the icons.

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When the presence of a person is detected, the reflected energy from the IR transmitter to the IR receiver will be high and the controller software detects this but will not activate the RF encoded signal. The controller periodically senses this condition by sending a low or "0" signal to the transmitter LED, D3 and then gates the IR receiver to detect the return pulse by the action of Q1. The purpose of the VR1 and VR2 rheostats is to properly set the gain and pulse shaping of the IR receiver for presentation to the controller IC. When the subsequent absence of a person is detected, the reflected energy from the IR transmitter to the IR receiver will be low and the controller software will send a low or "0" state to the message encoder via U3 pin 17.

The action of a low to the transistor gate, Q6, will cause it to conduct battery current to the encoder IC, U4. Since previous to this no energy was supplied to the encoder, the encoder cannot function and the RF circuit is held to an OFF or ultra low power mode and no RF energy is generated to the antenna. The action of the encoder when activated is to send out a 24 bit amplitude modulated signal which biases both the SAW resonator, Y1, and the RF transistor circuit, Q7. The resistor R24 times the release of the encoded 24 bit message to the RF transmitter and its value is fixed. This provides a coherent rate that may be "locked onto" by the receiver. The encoded message includes a silence period, a preamble period and the 24 bit code.

In the RF chain, the purpose of C29 and L2 is to reduce harmonics and pass the 318 MHz fundamental frequency generated by the RF transistor. In practice the transmitter and receiver may be operated for months without the necessity of a battery change. We hope this description is useful and thank you for your review.

Sincerely,

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